

This paper deals with two of Macleay's species—*Hinulia pardalis* (here *Sphenomorphus pardalis pardalis*) and *Mocoo nigricaudis* (here *Sphenomorphus nigricaudis nigricaudis*). Previous authors have placed *Lygosoma (Hinulia) elegantulum* Peters and Doria, and *Mocoo nigricaudis* in the synonymy of *S. pardalis*. It is shown that *S. pardalis* is specifically distinct from both *L. elegantulum* and *S. nigricaudis*. *Lygosoma atromaculatum* Garman is included in the synonymy of *S. pardalis pardalis*. It has been found necessary to describe a subspecies of *S. pardalis*. Peters and Doria's *L. elegantulum* is specifically synonymous with *S. nigricaudis*, which has priority, but retains subspecific rank. Standard descriptions are given of *S. pardalis pardalis* and *S. nigricaudis nigricaudis*. Systematic points of difference between the four forms and geographical distribution have been dealt with. All available references in literature have been noted.



Fig. 1.—Map showing localities where specimens of *Sphenomorphus pardalis* and *Sphenomorphus nigricaudis* dealt with in this paper have been collected.

II. SPHENOMORPHUS PARDALIS PARDALIS (Macleay). Pl. xi, fig. 1.

Hinulia pardalis Macleay, 1877, p. 63; Boulenger, 1887, p. 209; ? Boulenger, 1904, p. 80. *Lygosoma atromaculatum* Garman, 1901, p. 8; Zietz, 1920, p. 208. *Lygosoma pardalis* Zietz, 1920, p. 208. *Sphenomorphus pardalis* Loveridge, 1934, p. 352. *Sphenomorphus atromaculatus* Loveridge, 1934, p. 353.

Holotype No. MR 21 in the Macleay Museum, labelled "*Lygosoma (Hinulia) pardalis*, Macleay. Barrow Island, N.E. Aust."

Macleay's original description (1877, p. 63), which is especially valuable for its colour notes made soon after capture of the holotype, is republished:

"*Hinulia pardalis*.

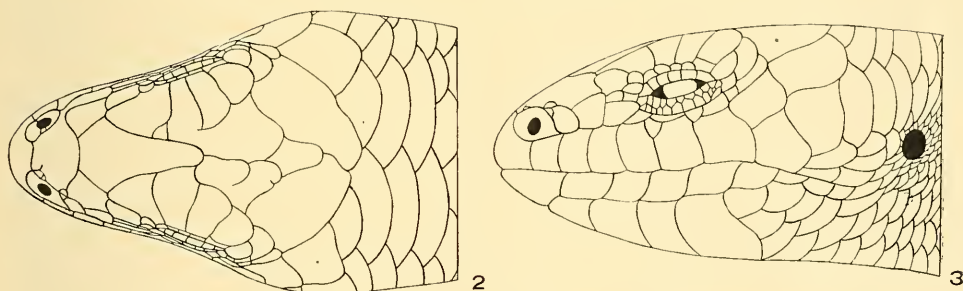
Moderately robust; tail acutely pointed, and about the length of the body; nasal plates not contiguous and large, with the nostril small and in the middle; fronto-nasals

not contiguous; interparietal small; other plates as in the last species;* ear opening small and oval without denticulations; scales on the back in four series; colour, pale olive on the back with numerous black spots, whitish on the sides, with very many black spots and blotches, and yellowish white on the under surface.

One specimen, about 7 inches long, from Barrow Island, N.E. Australia."

An extended redescription of the holotype follows. Although the head scales are sometimes abnormal from fusion, cutting off of small scales or grooving leading to incomplete separation, there is no doubt as to the arrangement and shape of scales. This is because in no case are both members of a pair, or paired sides of the same azygous scale, malformed.

Description of Holotype.—Rostral moderately high, area visible from above equal to about half that of the frontonasal, strongly concave sutures with nasals and slightly shorter, much less concave ones with 1st supralabials; the nearly straight junction with the frontonasal is equal to about half the width of the frontal. Nasals large with nostrils oval and sub-central; left scale a rough quadrilateral with the three rounded convex sides against rostral, frontonasal (including small scale divided off from it) and anterior loreal (and small scale divided off from it), fourth side straight and horizontal against 1st supralabial; right nasal rounded, in contact with rostral, frontonasal, 1st supralabial, also the abnormal 2nd supralabial with which part of the anterior loreal has fused. No supranasals. Frontonasal large and malformed, about two-thirds the area of the frontal with which it forms a straight suture approximately two-fifths the width of the latter scale, also in contact with rostral, nasals and prefrontals; on the left side it touches the anterior loreal and the small scale cut off from it; on the right it is in contact with the abnormal 2nd supralabial and abnormal



Figs. 2-3.—Dorsal and lateral views of head of holotype of *Sphenomorphus pardalis*. Actual head length, 12 mm., width, 10 mm.

posterior loreal; a small scale has been cut from it on the left anterolateral border and another partly divided off from the left lateral angle. Prefrontals large, left pentagonal in contact with frontonasal, frontal, 1st supraciliary, anterior and posterior loreals and just touching 1st supraocular, right quadrilateral with posterior relationship the same as that of its fellow, but anteriorly in contact with only frontonasal and posterior loreal. Frontal large, kite-shaped, half as long again as broad, long straight postero-lateral sides against 1st and 2nd supraoculars, rounded posterior end against frontoparietals, blunt anterior end against frontonasal and nearly straight anterolateral sutures with prefrontals, just separated from 1st supraciliaries. Frontoparietals paired, both large and malformed, right larger than left, long sinuous sutures with parietals, other contacts with frontal, 2nd, 3rd and 4th supraoculars and interparietal, left frontoparietal practically divided transversely and right fused to median posterior corner of 2nd supraocular. Interparietal kite-shaped, not much more than one-third the length of the frontal (40 per cent.), rounded behind, pointed anteriorly and laterally, long

* "*Hinulia atrocostata.*" Only two additional series of scales are dealt with: "supraorbital region of 4 plates and a little elevated; the first five upper labials equal and nearly square, the sixth and seventh larger and pentagonal".

contacts with parietals and short ones with frontoparietals. Parietals are the largest head shields, arranged in a V enclosing the interparietal and frontoparietals, each anteriorly in contact with 4th supraocular, 9th supraciliary and 2nd postocular, long lateral border against upper secondary temporal, right posteriorly in contact with two nuchals, left with one nuchal and a scale about half the size of a nuchal interpolated between 1st nuchal, parietal and upper secondary temporal; suture between parietals slopes backwards towards the left. There are three pairs of large nuchals, the anterior one on the left being largely separated from the parietal by the interpolated scale. Seven supralabials, anterior four roughly oblong, slightly higher than long, upper margins forming a fairly straight line with nasal, loreals, lower preocular and presubocular, the fourth being capped by the last-named scale, posterior three rough pentagons, lower margins straight and horizontal, anterior and posterior straight and vertical, the other two sides meeting in a point dorsally, suboculars between 4th and 5th and 5th and 6th, primary temporal between 6th and 7th, lower secondary temporal and two small postlabials behind 7th; 5th under centre of eye; size in decreasing order 6, 7, 5, 4, 3, 2, 1. Primary temporal squarish, subequal in area with 6th supralabial, posterodorsal border against upper secondary temporal, anterodorsal against 2nd and 3rd postoculars, two lower between 6th and 7th supralabials, anterior angle touches posterior subocular and the posterior angle the tertiary temporal. The upper secondary temporals are very large scales approaching the parietals in size, oblong in shape, sutures in order of decreasing length with parietals, lower secondary temporal, 1st nuchal (on the left the interpolated scale), primary temporal, tertiary temporal, 2nd postocular and a body scale, the last three contacts being much shorter than the others. Lower secondary temporal only slightly smaller than upper, more squat, higher than long, in contact with the other three temporals, 7th supralabial and a postlabial. Tertiary temporal long and band-like, long axis approximately vertical. It and the lower secondary temporal are divided on the right side. Body scales begin behind the nuchals, interpolated scale on left side, upper secondary temporal, tertiary temporal and postlabials. The two loreals are practically normal on the left except for a small scale divided off the upper margin of the anterior one; the small anterior loreal lies between nasal, frontonasal, prefrontal, posterior loreal, and 1st and 2nd supralabials, only narrowly touching the 1st; the posterior, which is nearly twice the size of the anterior, has a very long suture with the prefrontal and is also in contact with anterior loreal, 2nd and 3rd supralabials, preoculars, and 1st supraciliary; on the right side the posterior borders of the posterior loreal are normal but the anterior loreal has disappeared as an entity, portions being fused to posterior loreal, 1st and 2nd supralabials, frontonasal and prefrontal; fusion with the posterior loreal and frontonasal makes these two scales continuous, but the others have well-developed sutures. Upper and lower palpebral series abut against their respective preoculars. The upper preocular has also long sutures with the lower preocular and 1st supraciliary and short ones with posterior loreal and upper accessory palpebral; it is divided on the left side. The upper preocular is only half the size of the lower, which is in contact with upper preocular, posterior loreal, 3rd and 4th supralabials and presubocular, which is wedged between lower preocular, 4th supralabial and the most anterior subocular. The subocular chain is ill-defined, consisting of about eight scales, three large between dorsally-directed points of 4th and 5th and 5th and 6th supralabials and capping 6th supralabial; the other scales are smaller and either join or cap these three. The postoculars are three small scales, the 1st anterior and against 8th supraciliary and lower palpebral chain; 2nd and 3rd lying in front of primary temporal; 2nd, which is at least twice as large as each of the others, is also in contact with upper secondary temporal, parietal and 9th supraciliary. Of the nine supraciliaries, the 1st is by far the largest, the 8th and 9th ranking next; the 1st is a rough oblong between 1st supraocular, prefrontal, posterior loreal, upper preocular, upper accessory palpebral and 2nd supraciliary; the next six scales are irregular; the 8th and 9th are subequal in size and lie between 4th supraocular, postoculars and parietal; the upper palpebral series abuts against the 8th. There are four large supraoculars, the 2nd being the largest, the frontal is in contact

with the 1st and 2nd, the frontoparietal with the 2nd, 3rd and 4th, and parietal with the 4th; the scales are somewhat irregular and the sutures between the anterior two are abnormal or incomplete. The lower eyelid is scaly, its rim being formed by about eight equidimensional or elongated scales of the lower palpebral series over about 11 scales, two or three in the centre being the largest. Infralabials five, all elongated. Large mental in contact with two supralabials when mouth is closed, one infralabial and the large postmental. Three pairs of large chin-shields, 1st and 2nd pairs separated by an azygous, kite-shaped scale, 3rd pair by three scales. Ear oval, about half length of eye, without denticulation, separated by two or three scales from 7th supralabial.

Scales in 24 rows at midbody, lateral and ventral scales subequal, two dorsal rows markedly larger. Caudal scales much larger than those of body especially a dorsal row. Two enlarged preanal scales, each twice the size of a ventral scale at midbody. Scales from above vent to parietals, 57. Habitus compact, body only very slightly depressed. Snout shorter than the space between eye and ear. The distance between the end of the snout and the forelimb is contained 1.54 times in the distance between axilla and groin. Tail, which is apparently intact, thick and tapering to a fine point; slightly longer than head and body; broken twice near body since being preserved. Limbs short and reasonably powerful, well separated by about the length of the forearm and manus when adpressed. The 3rd and 4th fingers and toes are by far the longest. Lamellar formula for fingers, 4, ? (both 2nd fingers mutilated), 12, 11, 5. There are about 36 rounded tubercles on the palm, arranged in rough transverse rows. Lamellar formula for toes, 6, 11, 18, 20, 11. There are about 45 rounded tubercles on the sole, the proximal row being large and pointed.

Measurements of Holotype in mm.

Snout-vent	72	Head, length	12
Tail	77	Head, width	10
Snout-forelimb	26	Forelimb, length	13
Axilla-groin	40	Hindlimb, length	20
	Width of body	11.5

Colour: Ground colour of head, body and tail is light olive. There are no lines or stripes, only black dots averaging about half a scale in size, very few filling an entire scale. These black dots are scattered singly and in groups, where they are on different scales. They are lightly sprinkled over the dorsal surface of the head, being inclined to margin scales such as the supraoculars. From the head to above the forelimbs there is the vaguest suggestion of four irregular longitudinal lines; about a third of this area is black. The body is dorsally about half black, two or three large black spots being commonly aggregated. Spots on the tail have about the same intensity, but here there are two or more longitudinally disposed dots on each scale. The side of the head is heavily barred vertically. The dorsolateral areas are practically clear from the head to above the vent. Below these clear spaces there is a fairly dense aggregation of large black spots along the flanks. Half way down the sides the spots become separate and fade out ventro-laterally in a series of small dots. Neither a clear space nor a marked aggregation of dots occurs on the tail, which is marked much the same laterally and dorsally. The underside from the throat, which is sprinkled with black, to the vent shows no trace of black and is light olive much as the back. The tail below is fairly clear but dotted at intervals.

Garman's type description of his *Lygosoma atromaculatum* (1901, p. 8), which is here placed in the synonymy of *S. p. pardalis*, is given for purposes of comparison.

"Form similar to that of *L. isolepis* Boul. Body elongate, slightly depressed; limbs short, rather weak, not meeting by the length of the arm when adpressed; feet pentadactyl; tail one and one-half times as long as head and body, thick, round, tapering regularly. Distance from snout to fore-leg contained one and one-half times in the distance from axilla to vent. Snout short, shorter than the space between the eye and the ear. Lower eyelid scaly, transparent. Rostral hexagonal, wider than high, truncate,

in contact with the frontonasal. Nostril pierced in a single nasal; no supranasal. Nasal quadrangular, in contact with the first labial; postnasal in contact with the second labial; loreal in contact with second and third labials. Labials seven, fifth and sixth below the eye. Frontal one and one-half times as long as wide, broadly in contact with the frontonasal and with the anterior two pairs of supraoculars; prefrontals small; frontonasal broader than long, octagonal; frontoparietals moderate, little larger than the interparietal; parietals large, meeting behind the interparietal. Three to four pairs of nuchals, twice as wide as the shields behind them. A large shield and a much smaller one at the outer side of each parietal. Four supraorbitals, second widest. Five or six broad shields between the eye and the ear. Seven or eight supraciliaries. Mental shield large, broad, in contact with two labials and a submental. Anterior submental broader than long, in contact with five shields, followed on each side by four broad submentals, the anterior pair of which meet on the median line, the second pair are separated by a single small scale, and a third pair are separated by three scales. Ear opening subelliptical, oblique, little smaller than the eye, with several hardly noticeable lobules on the anterior border. Scales smooth, in twenty-four rows around the body, dorsals larger and laterals little smaller than the ventrals; a pair of enlarged preanals. Below the tail the scales are somewhat larger than those on the upper surfaces. Rostral, nasals, first labial and mentals have in most cases the appearance of being thicker than the other head scales or of having retained the slough. Digits weak, slightly compressed; subdigital lamellae forming a low keel, nineteen under the fourth toe.

Bronzed olive on the back, more or less lightly sprinkled with black spots which become more numerous toward and on the tail and on the limbs. Belly and lower side of tail uniform whitish. Scales of sides and lower surfaces of head and throat with black spots, those of labials and submentals most intense. Entire flanks closely spotted with small black spots; in cases the spots of sides and back become longitudinal streaks. On some individuals the back is more thickly covered with spots which are smaller forward and on the back of the head, and each labial bears a white vertical bar in the middle, the black spots being situated on the sutures and covering a portion of each scale.

Differs from *L. isolepis* Boul. and *L. elegantulum* Pet. & Dor. in the smaller number of scales.

Barrier Reef, Australia; G.B.R. Exp.: Queensland; Mr. Olive."

Of the approximately 86 characters dealt with in Garman's description of *S. atromaculatus*, 76 agree exactly with those of *S. p. pardalis*. The remaining 10 represent at most slight differences and are discussed hereunder.

Description of Cotypes of <i>S. atromaculatus</i> .	Holotype of <i>S. pardalis</i> .
1. "tail one and one-half times as long as head and body".	Tail is only slightly longer than head and body. Tail may have been damaged. This character is almost always very variable in the genus.
2. "lower eyelid . . . transparent".	The central enlarged scales of the lower eyelid are at least translucent.
3. "frontoparietals . . . little larger than the interparietal".	Each frontoparietal twice the size of the interparietal.
4. "seven or eight supraciliaries".	Nine supraciliaries, but only three large, the remainder small. A variable character in the genus.
5. "anterior submental . . . followed on each side by four broad submentals".	Three pairs of chin-shields follow the postmental, not four. Garman described three pairs of chin-shields, calling them submentals, exactly as they occur in the type of <i>pardalis</i> . His "four" was probably a lapsus for three unless he included the unpaired postmental, which he called anterior submental, as the fourth submental.
6. "ear-opening . . . oblique".	Ear opening vertical.

Description of Cotypes of <i>S. atromaculatus</i> .	Holotype of <i>S. pardalis</i> .
7. "ear-opening . . ., with several hardly noticeable lobules on the anterior border".	No trace of lobules, but when scales dry slightly during examination the borders give the impression that lobules are present.
8. "rostral, nasals, first labial and mentals have in most cases the appearance of being thicker than the other head scales or of having retained the slough".	There is little or no difference in the appearance of these scales. The presence of sloughing would probably depend on the season at which specimens were collected.
9. "subdigital lamellae . . ., nineteen under the fourth toe".	Twenty in <i>pardalis</i> . A form may be characterized by a narrow range in the number of lamellae, but there is never an exact, invariable number of lamellae.
10. "belly and lower side of tail uniform whitish".	The underside is uniform, but now greenish, probably partly due to preservation. Macleay, who examined the specimen shortly after it had been collected, said "yellowish white on the under surface".

Of the points of difference only numbers 3 and 6 appear to be of any significance, and the last is probably only an individual difference. The relationships of the frontoparietals to the interparietal may be expected to fluctuate to some extent even in neighbouring populations. Unless constant and prominent, they would not justify subspecific differentiation, especially when swamped by the correspondence of 85 other characters out of 86 considered. Supposing the original mainland stock to have been practically homogeneous when the coastal islands were cut off by submergence of low-lying coastal areas, say 10,000 years ago, slight differences must have developed between isolated populations. It is indeed remarkable that under the circumstances, specimens collected on separated islands should show such little variation. The overwhelming weight of evidence is that Garman's *Lygosoma atromaculatum* is conspecific with Macleay's *Hinulia pardalis*.

Locality Records of S. p. pardalis.

In this and the following lists the original reference is given when possible followed by the collector's name (when available) in brackets and date of collection.

Barrier Reef: Garman (1901, p. 8) 2 cotypes of *Lygosoma atromaculatum* (M.C.Z. 6475) (A. G. Mayer) 1896.

Barrow Island, N.E. Australia: Macleay (1877, p. 63) holotype of *Hinulia pardalis*.

Coen: Loveridge (1934, p. 353) under *Sphenomorphus atromaculatus*, 23 specimens (M.C.Z. 35412-34) (P. J. Darlington) 1932.

Cooktown: Loveridge (1934, p. 353) "3 cotypes" of *Lygosoma atromaculatum* (M.C.Z. 6478) (E. A. Olive) 1896.

Except for Zietz (1920, p. 208), who lists it from Queensland and the Barrier Reef, I have been unable to find other references to *S. atromaculatus* beyond its treatment in Loveridge's 1934 paper, which is invaluable to all Australian herpetologists. Loveridge, who had 28 specimens under examination, two cotypes (M.C.Z. 6475) from the Barrier Reef, collected by A. G. Mayer; three other cotypes (M.C.Z. 6478) from Cooktown, collected by E. A. Olive; and 23 specimens (M.C.Z. 35412-34) collected at Coen in 1932 by P. J. Darlington, says (1934, p. 353): "Midbody scale-rows 24 (every individual counted); frontonasal forming sutures with the rostral and frontal; scales bordering the parietals posteriorly on right and left sides respectively 2 + 2 (in 13 skinks), 2 + 3 (in 10), 3 + 2 (in 2), 3 + 3 (in 3); adpressed limbs do not nearly meet. Largest skink (No. 35412) measures 142 (63 + 79) mm. This skink is very similar to *S. pardalis* and must be extremely difficult to distinguish without comparative material. It is well named, for the aggregation of black markings along the flanks are, perhaps, its most distinguishing feature. The unusual constancy in a skink of a fixed number of midbody scale-rows is interesting; in this connection it may be noted that a single *pardalis* was also taken at Coen but was eliminated by its larger size and absence of characteristic *atromaculatus* markings quite apart from its 26 midbody scale-rows. It will also be noted that there is a single skink with 24 midbody scale-rows referred to

pardalis. Here again I have no doubts as to its correct relegation to that species. Possibly *atromaculatus* has but recently been subject to speciation."

III. SPHENOMORPHUS PARDALIS ERRO, n. subsp. Pl. xi, fig. 2.

Diagnosis: Closely allied to *Sphenomorphus pardalis pardalis* but separated by the bright reddish-brown ground colour (instead of pale greenish-olive), and to a lesser degree by slimmer build, greater length of interparietal, and other scale characters dealt with in the following notes and table.

Holotype. No. R 6352 in the Australian Museum, Sydney, from the old collection, locality unknown. The single paratype No. R 6373 appears to have been collected at the same unidentified locality.

In both specimens the scales are clear cut and show no sign of the tendency towards malformation so evident in the holotype of *S. p. pardalis*, where it is evidently due to some genetic instability.

R 6352 and R 6373 resemble each other in scale characters almost as if they were twins and there is the strongest resemblance to *S. p. pardalis*. Holotype and paratype have been treated together in the following notes, and where *S. p. erro* differs from *S. p. pardalis* the character of the latter subspecies in question is included in brackets. The two subspecies are identical in all points not mentioned. This is also the case where it has been thought advisable to mention other characters.

Table of Measurements in mm. and Other Characters of Holotype and Paratype of S. p. erro, with Those of S. p. pardalis for Comparison.

	R 6352	R 6373	MR 21
Snout-vent	59	56	72
Tail	83+*	58+	77
Snout-forelimb	21	19	26
Axilla-groin	35	31	40
Head, length	10	9.5	12
Head, width	9	8	10
Forelimb, length	11.5	11	13
Hindlimb, length	18	17	20
Width of body	10	8.5	11.5
Axilla-groin/Snout-forelimb	1.67	1.63	1.54
Tail/Body	1.41+	—	1.07
Suture of frontonasal with frontal to width of frontal	1/3	1/3	2/5
Length of interparietal to length of frontal	55%	60%	40%
Nuchals, left and right sides	3-3	3-3	3-3
Scales touching postero-lateral border of parietals, † left and right	2-4	3-4	3-3
Supraciliaries	9	9	9
Infralabials	5	5	5
Infralabials in contact with postmental on each side	1	1	1
Number of scales from above vent to parietals	60	54	57
Lamellae beneath fingers	4, 6, 10, 10, 7	4, 7, 10, 10, ?	4, 2, 12, 11, 5
Lamellae beneath toes	6, 10, 14, 18, ‡ 11	6, 9, 15, 18, 10	6, 11, 18, 20, 11
Midbody scale rows	24	24	24

* Practically complete, extreme tip bifid.

† Including upper secondary temporal, interpolated scales and nuchals.

‡ 15 on short right toe.

In both R 6352 and R 6373 the width of the suture of the rostral with the frontonasal equals $\frac{1}{3}$ the width of the frontal ($\frac{1}{2}$), and the area of the rostral visible from above is equal to at least $\frac{2}{3}$ that of the frontonasal (about $\frac{1}{2}$). The nasal is in contact with $\frac{9}{10}$ of the upper margin of the 1st supralabial. Prefrontals just touch the 1st supraciliaries. The lower border of the posterior loreal is against the 2nd and 3rd supralabials. R 6373 has the three postoculars very small. The primary temporal in R 6352 is slightly smaller than the 6th supralabial, in R 6373 it is little more than half its size (subequal). The two specimens are identical in colour and markings. The bright reddish-brown ground colour resembling that of *Sphenomorphus nigricaudis elegantulus* is in striking

contrast to the pale greenish-olive of *S. p. pardalis*. The dorsum is more sparingly sprinkled with black than in *S. p. pardalis*. Black markings are aggregated along the flanks but again are less concentrated than in *S. p. pardalis*. There is a greater tendency towards vertical barring of the sides between the ear and the forelimb than in the nominate subspecies. This is more pronounced in R 6373. The whole ventral surface, except for short bars along the sutures between the infralabials, is of much lighter brown than the dorsum. Although the ground colour is that of *S. n. elegantulus*, the pattern is much like that of *S. p. pardalis*. A topotype of *S. n. elegantulus* (R 9599) lacks the dense concentration of markings along the sides, is lighter ventrally, and more heavily spotted and cross-banded across the dorsum anteriorly from the head to the length of the forelimb behind the shoulders.

I was reluctant to describe this subspecies because of the unknown origin of the specimens, but there was no alternative. *S. p. erro* is strikingly different in colour to *S. p. pardalis*, yet there is no doubt that it belongs to the same species. In handling specimens of the two forms, one is impressed by the close similarity in scalation except for comparatively minor differences already mentioned. *S. p. erro* is sharply separated from *S. n. nigricaudis* and *S. n. elegantulus* by the lower number of midbody scale rows and the fact that the postlabial is in contact with only one infralabial instead of two (see Figs. 6 and 7). The fact that the only two specimens in the Australian Museum agree in the number of midbody scale rows and the postlabial contact indicates that they are representatives of a population normally possessing these characters, and immensely lessens the possibility that they are exceptional varieties of a population possessing other characters. I am confident that this subspecies will be rediscovered—probably in north Queensland. Its present homeless condition has been suggested by its subspecific name—the Latin noun for wanderer—placed in apposition.

IV. SPHENOMORPHUS NIGRICAUDIS NIGRICAUDIS (Macleay). Pl. xi, fig. 3.

Mocoo nigricaudis Macleay, 1877, p. 63. *Homolepida crassicauda* Barbour (non Duméril), 1914, p. 204.

Cotypes. Nos. MR 376–380 in the Macleay Museum labelled "*Lygosoma (Mocoo) nigricaudis* Macleay. Darnley Island".

MR 378 is here designated the lectotype, the remaining four specimens becoming paratypes.

It appears to the author that it is as essential to choose a single specimen in redescription where cotypes are involved as to designate a holotype in an original description. Davis and Lee (1944, p. 18) put the matter clearly: "Where an early worker used a series of specimens as the basis of his original description without designating one as type (a practice which has led to considerable confusion and for the perpetuation of which there can be no excuse), these may be regarded as syntypes or cotypes. In cases such as the preceding the onus is on the subsequent reviewer to select one specimen, the lectotype, to act for the future as the true single type."

Dunn (1934, p. 171) says: "If the cotypes of a species turn out to represent two different forms some revisionary restriction of the cotype series is necessary. In no other situation is discrimination between cotypes necessary, nor has it any legal sanction." The difficulty is that reviewers cannot know what future refinements there may be in systematic technique or requirements. All possibility of confusion is avoided when a single specimen, which obviously can at any time belong to only one form, is chosen. Mayr (1942, p. 15) is definite on this point. Where the author of a species has used cotypes and distributed some of them, as in the special case given by Dunn, a worker would be guilty of unethical conduct if he selected a lectotype without consulting the author if available. This position does not apply here where all cotypes have been kept together.

Darnley (or Erub) Island (9° 30' S, 143° 42' E) is a high, wooded, fertile, volcanic island in Torres Strait, near the northern tip of the Great Barrier Reef.

Following is Macleay's original description (1877, p. 63), mainly important, as in the case of *S. p. pardalis*, for the early observations on colour.

"*Mocoo nigricaudis*."

Ear opening nearly round, without denticulation; rostral plate rounded above; nasals not contiguous; fronto-nasals nearly contiguous; supraorbitals four; fronto-parietals two, of the same size as the interparietal; scales of the back in about six series; colour, reddish brown above with a few scattered black spots—these become very dense towards the apex of the tail, giving it a black appearance; the under surface is greyish yellow; the labial plates are spotted with black; body moderately robust; limbs weak; toes of fore feet short; total length, 9 inches.

Hab. Darnley Island."

The scheme of the following redescription of the lectotype is identical with that used earlier for *S. p. pardalis*.

Description of Lectotype.—Rostral moderately high, area visible from above equal to nearly half that of the frontonasal, strongly concave sutures with nasals and much less concave, nearly straight, ones, half the length of those with the nasals, with 1st supralabials, the convex suture with the frontonasal is equal to nearly half the width of the frontal. Nasals large, with nostrils oval and slightly behind the mid-line, convex sutures with rostral, frontonasal, anterior loreal and 1st supralabial, in contact with

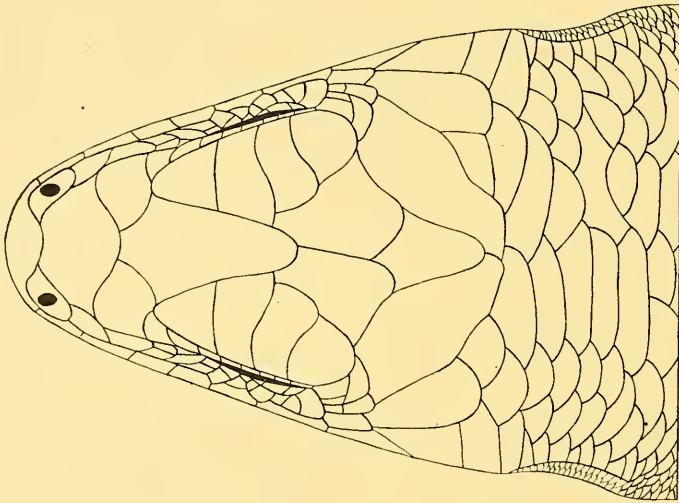


Fig. 4.

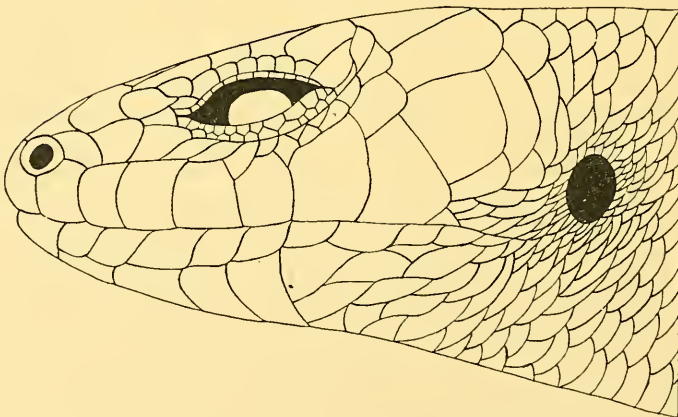


Fig. 5.

Figs. 4-5.—Head of lectotype of *Sphenomorphus nigricaudis nigricaudis*. Actual head length, 13 mm., width, 11 mm. 4. Dorsal view. 5. Lateral view.

about two-thirds the upper margin of the latter scale. Frontonasal large, at least two-thirds the area of the frontal with which it forms a nearly straight suture only one-fifth the width of the latter scale, also in contact with rostral, nasals, prefrontals and anterior loreals. Prefrontals large, in contact with frontonasal, frontal, 1st supraciliary, anterior and posterior loreals, just touching 1st supraoculars. Frontal large, kite-shaped, half as long again as broad, long straight postero-lateral sides against 1st and 2nd supraoculars, rounded posterior end between frontoparietals, blunt anterior end against frontonasal, and slightly concave antero-lateral sutures with prefrontals, just separated from 1st supraciliaries. Frontoparietals paired, large, and symmetrical except that the suture between them slants backwards towards the left, strongly indented against frontal, short transverse suture with 2nd supraocular, long slightly concave antero-lateral border against 3rd and 4th supraoculars, sinuous contact with parietal and sinuous slightly shorter one with interparietal. Interparietal large, kite-shaped, considerably more than half the length of the frontal (60 per cent.), rounded behind, pointed anteriorly and laterally, long, straight contacts with parietals, and little shorter, sinuous, mainly concave ones with frontoparietals. Parietals are the largest head shields, rather irregular in shape, twice as long as wide, each anteriorly in contact with frontoparietal, 4th supraocular, 10th supraciliary and 2nd postocular, the contact with the 4th supraocular being very short and that with the 2nd postocular little longer; separated by interparietal except for a short suture one-quarter the length of the interparietal; left postero-lateral suture against upper secondary temporal, anterior nuchal and a scale interpolated between these two, right border similar but in contact with two interpolated scales and just touching a second nuchal. There are five distinct nuchals on the left side, the scales are irregular on the right, with only two well-marked nuchals, which correspond to the first and third on the left. Seven supralabials, 1st, 2nd and 3rd with concave posterior sutures, other four convex, all higher than long, 1st with dorsal peak between nasal and anterior loreal, 2nd straight against the two loreals, 3rd straight and capped by lower preocular and presubocular, 4th to 7th pointed dorsally, 4th and 5th between suboculars, 6th between suboculars and primary temporal, 7th between primary temporal and lower secondary temporal, two postlabials behind 7th; 5th under centre of eye; size in decreasing order, left side, 6, 7, 4, 3, 1, 5, 2, right side, 6, 7, 5, 3, 4, 1, 2. Primary temporal squarish, considerably smaller than 6th supralabial, two lower sides between 6th and 7th supralabials, antero-dorsal against 2nd and 3rd postoculars, and postero-dorsal against upper secondary temporal, posterior angle touches tertiary temporal and anterior the last of the suboculars. The upper secondary temporals are large scales, each about half the size of a parietal, roughly oblong, long sutures with parietal, lower secondary temporal, shorter with body scales (three contacts on right, two on left), primary and tertiary temporals, and very short with 2nd postocular. Lower secondary temporal about equal in size to the upper, nearly square, long sutures with upper secondary temporal, 7th supralabial and the tall, upright, band-like tertiary temporal, shorter lower border against upper postlabial and in front narrowly in contact with primary temporal. Body scales begin behind the nuchals, interpolated scales, upper secondary temporals and postlabials. The two loreals are large and about equal in size, anterior roughly lens-shaped with one long, smoothly convex border against frontonasal, prefrontal and posterior loreal, other border more irregular and in three steps against nasal and 1st and 2nd supralabials; posterior loreal quadrilateral, posterior side against upper and lower preoculars, upper against 1st supraciliary and prefrontal, other two sides against anterior loreal and 2nd supralabial. Upper and lower palpebral series abut against the upper preocular, which is also in contact with 1st supraciliary, posterior loreal, lower preocular and upper accessory palpebral, which is wedged between the palpebral chain and 1st and 2nd supraciliaries. The lower preocular is twice the size of the upper and lies between it, the posterior loreal, 3rd supralabial and presubocular; its posterior angle touches the lower palpebral chain. The presubocular is wedged between the lower preocular, 3rd supralabial and the most anterior subocular. The suboculars are reasonably prominent and consist of five or six scales, all in contact capping the 4th, 5th and 6th supralabials

or sending down points between them; there are other smaller scales above the main row. The postoculars are three small scales, the 1st anterior and against the 9th supraciliary and a small, rounded scale lying against the end of the lower palpebral chain, the 2nd and 3rd lying in front of the primary temporal; the 2nd, which is larger than the others and subequal in size to the 10th supraciliary, is in contact with the primary temporal, upper secondary temporal, parietal, 10th supraciliary and 1st postocular. Of the 10 supraciliaries, the 1st is by far the largest, the 10th and 9th ranking next; the intermediate six are often little more than nodules; the 1st is narrowly separated from the frontal and lies between the 1st supraocular, prefrontal, posterior loreal, upper preocular, upper accessory palpebral and 2nd supraciliary; the 9th and 10th lie between the 4th supraocular, parietal, and 1st and 2nd postoculars; the upper palpebral series ends against the 9th. There are four large supraoculars, the 2nd the largest; the frontal is in contact with the 1st and 2nd, the frontoparietal with the 2nd, 3rd and 4th, and the parietal is narrowly in contact with the 4th. The lower eyelid is scaly, its rim being formed of about ten scales interlocking with those below. Infralabials seven, all much the same in depth but more elongated posteriorly. Large mental in contact with just half the lower border of the 1st supralabial when the mouth is closed. Broad postmental in contact with two infralabials on each side, the anterior chin-shields and mental, making seven scales in all (see Fig. 6). Three large pairs of chin-shields, 1st in contact, 2nd separated by a small triangular scale, and 3rd pair by three small scales.

Ear opening oval, greater diameter equal to two-thirds the length of the eye, without denticulation, separated by three scales from 7th supralabial.

Scales in 28 rows at midbody, dorsal scales considerably larger than ventral, lateral scales much smaller again. Caudal scales dorsally much the same size as those on the body until quite near the tip of the tail; laterally much larger; ventrally very large, especially the median row of transverse scales, which begins about the length of the hindlimb behind the vent. Two large preanals, each twice the size of a ventral scale at midbody. Scales from above vent to parietals, 58. Habitus compact, body slightly depressed. Snout shorter than the distance between eye and ear. The distance between the end of the snout and the forelimb is contained 1.48 times in the distance between axilla and groin. Tail thick, tapering to a fine point, apparently intact, slightly longer than body. Limbs short, reasonably powerful, separated when adpressed by about the length of the manus. Length of fingers in decreasing order 4 = 3, 2, 5, 1; of toes, 4, 3, 5, 2, 1. Lamellar formula for fingers, 5, 8, 10, 12, 6. There are about 40 small, rounded at base, pointed tubercles on the palm and four or five large ones edge the wrist. Lamellar formula for toes, 5, 8, 14, 17, 10. There are about 50 rounded tubercles on the sole, the proximal ones larger and arranged in two or three rows.

Measurements of the lectotype are given with those of the paratypes.

Colour: Dorsal surface of head and body uniform brown, about 20 small blackish spots occur on the back in the area 10 scales before and 15 behind the forelimbs. The spots average about $\frac{1}{3}$ the area of a scale and are nearly uniform in size. The underside of the head, body and tail (except for the terminal fifth) is uniform light brown, now little different to the dorsal ground colour. The blackish spots on the supra- and infralabials, suboculars, preoculars, supraciliaries and temporals do not exceed 25 in number. There are scattered small black spots on the sides of the body, mainly on the dorso-lateral region before the forelimbs, but descending laterally behind them. The posterior half of the area between axilla and groin is clear. There are about 25 spots on each side. A very few spots occur on the dorsum of the proximal fifth of the tail, then the next two-fifths is sprinkled. The terminal two-fifths is black dorsally and laterally. Only odd spots occur laterally on the proximal fifth of the tail. The dorsal surfaces of the limbs are spotted with black.

Variation in Paratypes.—The series of five (lectotype and four paratypes) is very uniform and there is even a strong family likeness, but there is some variation. The length of the interparietal in MR 376 agrees with that of MR 378 in being equal to 60 per cent. of the length of the frontal; in the other three specimens it is 70 per cent.

The interparietal is subequal in area to a frontoparietal in MR 378 and MR 379; as long but narrower in the other three cases. In MR 376 the suture between the parietals slopes backwards towards the right instead of left as normally. The nuchals have a strong tendency to be more numerous and regular on the left side. The following table summarizes the relations to the scales following the parietals, and also the arrangement of nuchals.

	Nuchals.		Scales touching Postero-lateral Border.*	
	Left.	Right.	Left.	Right.
MR 376	5	2†	4	3
MR 377	4	3	3	4
MR 378	5	2‡	3	5
MR 379	4	3	3	4
MR 380	4	4	3	4

* Including upper secondary temporal, interpolated scales and nuchals.
 † 2nd corresponding to 4th on left.
 ‡ 2nd corresponding to 3rd on left.

Although the 6th and 7th are always the largest two supralabials and the 1st and 2nd generally the smallest, these scales vary somewhat irregularly as indicated in the following table, which gives sizes in decreasing order.

	MR 376	MR 377	MR 378	MR 379	MR 380
Left Side ..	6735412	6735421	6743152	6735421	7635412
Right Side ..	6735241	6735412	6753412	6734512	7631254

The 6th supralabial narrowly touches the primary temporal in three cases. On the right side of MR 376, as in MR 378, the contact is long, but on the left the two scales are separated by the large last subocular which touches the 7th supralabial. MR 377 and MR 380 have the lower border of the posterior loreal equally in contact with the 2nd and 3rd supralabials on the right, but not on the left side, where it touches only the 2nd. MR 379 has the right posterior loreal narrowly in contact with the 3rd supralabial as well as a long suture with the second. The anterior loreal is partly divided on the left side in MR 376. In MR 376 the lower preocular is in contact with the 2nd supralabial as well as the 3rd. The right presubocular in MR 379 touches the 4th as well as the 3rd supralabial. MR 377 and MR 380 have their suboculars much more prominent than in MR 378. MR 376 and MR 377 have nine supraciliaries: these scales are most strongly developed in MR 380. There are six infralabials in MR 376 and MR 379. There may be as many as six scales separating the ear from the 7th supralabial, but in this case the posterior three are very small. All specimens have 28 midbody scale rows. Number of scales from above vent to parietals is 56 (twice),

Measurements of Lectotype and Paratypes of Sphenomorphus nigricaudis nigricaudis in mm.

	MR 376	MR 377	MR 378	MR 379	MR 380
Snout-vent	75	78	76	71	78
Tail	78+	28+	90	84+	96
Snout-forelimb	26	27	27	26	25
Axilla-groin	40	44	40	39	42
Head, length	12.5	13	13	12	14
Head, width	10.5	11	11	10	11.5
Limbs, length forelimb	13	14	13	12.5	14
Limbs, length hindlimb	21	23	24	20	24
Width of body	13	13	14	12	14
Axilla-groin	—	—	—	—	—
Snout-forelimb	1.54	1.63	1.48	1.50	1.68
Tail/Snout-vent	—	—	1.18	—	1.23

57 and 58. MR 377 has had the tail broken off about 15 mm. behind the vent and the regenerated portion, a stub about 10 mm. long, is only about one-third the diameter of the tail it replaces. MR 380 has had its tail snapped off but preserved. Number of lamellae under the 4th toe is MR 376, 20; MR 377, feet on both sides mutilated; MR 379, 18; MR 380 with 17 agrees with the lectotype. Accidents, probably attacks by birds, have caused the loss of, or damage to, three of the five tails in the series, the loss of the left manus and the ends of two toes in MR 377 and four left toes of MR 376.

Variation in colour is not very striking. All specimens have the uniform reddish-brown dorsal ground colour. MR 376 and MR 377 are more distinctly spotted anterior to the forelimbs than MR 378. In MR 376 and MR 377 the black dots give the suggestion of six or seven cross bars, and these are continued laterally. MR 379 is almost undotted dorsally but has four distinct vertical bars between the ear and forelimb on each side. The same lizard has ill-defined narrow lines along the sides of the body. All specimens have the labials and adjacent scales somewhat spotted. Except in MR 377, where it is missing, the distal third to two-thirds of the tail, not the base as mentioned by Loveridge (1934, p. 353), is blackish with a dense aggregation of pigment. This is most conspicuous in MR 380, which otherwise almost duplicates MR 378 in colour and markings.

Locality Records of S. n. nigricaudis.

Darnley Island: Macleay (1877, p. 63) type locality of *Mocoo nigricaudis*; and Barbour (1914, p. 204) under *Homolepida crassicauda*.

South-East Cape, New Guinea: Nos. A 5654 and A 5682 in the Australian Museum ("through Rev. Macfarlane from teachers and natives, 1879").

As far as I can ascertain there is no South-East Cape in New Guinea, but it is almost certain that the specimens came from the neighbourhood of East Cape, where Macfarlane is known to have collected extensively.

Table of Measurements in mm. and Other Characters of S. n. nigricaudis in the Australian Museum.

	A 5654	A 5682
Snout-vent	80	73
Tail	58+	105
Snout-forelimb	27	24
Axilla-groin	42	40
Head, length	13	13
Head, width	11.5	11
Forelimb, length	14	15
Hindlimb, length	23	23
Width of body	13.5	13
Axilla-groin/Snout-forelimb	1.56	1.67
Tail/Body	—	1.44
Width of suture of rostral with frontonasal to width of frontal	1/3	1/3
Upper margin of 1st supralabial in contact with nasal	2/3	2/3
Width of suture of frontonasal with frontal to width of frontal	1/5	1/5
Length of interparietal to length of frontal	65%	80%
Number of nuchals, left and right sides	5-4	4-4
Number of scales touching postero-lateral sides of parietals,* left and right	2-3	2-3
Supracillaries	10	10
Infralabials	6	6
Lamellae beneath 4th toe	20	19
Midbody scale rows	28	28

* Including upper secondary temporal, interpolated scales and nuchals.

The lower border of the posterior loreal is in contact with the 2nd supralabial only. Habitus of these lizards and the Darnley Island holotype and paratypes is very close. In colour they closely resemble the types except that they are considerably more heavily spotted, especially A 5682. This specimen has the distal third of the tail dark though not as conspicuously so as MR 378. The distal third of the tail in A 5654 has been damaged.

Differences between S. nigricaudis nigricaudis and S. pardalis pardalis.—These closely allied forms are yet separated in so many characters that a list of these can only help treatment and comparison.

The posterior border of the rostral makes sweeping curves, first concave with the nasals and then convex with the frontonasal, as it passes between the supralabials in *nigricaudis*. In *pardalis* the contact with the frontonasal is nearly straight.

Contact of the frontonasal with the anterior loreal is much longer and has a quite different outline in *nigricaudis*, the length of the contact of the frontonasal with the anterior loreal being twice that of the prefrontal with the same scale. In *pardalis* these proportions are reversed.

The interparietal is much better developed in *nigricaudis* than in *pardalis*, its length compared with the length of the frontal being 60 per cent. (in the lectotype and one paratype, 70 per cent. in the other three paratypes) against 40 per cent.

The length of the suture between the parietals is equal to 25 per cent. of the length of the interparietal in *nigricaudis*; 60 per cent. in *pardalis*.

The primary temporal in *nigricaudis* is much smaller than in *pardalis*.

The upper secondary temporal is relatively smaller in *nigricaudis*.

The anterior loreal in *pardalis* is much smaller than the posterior; they are of equal size in *nigricaudis*.

In *nigricaudis* the posterior loreal is not in contact with the 3rd supralabial as it is in *pardalis*.

The lower preocular in *nigricaudis* is widely separated from the 4th supralabial; it is in contact in *pardalis*.

Nigricaudis has seven infralabials; *pardalis* five. Their outlines are also distinctive.

In *nigricaudis* the mental is in contact with half the margin of the 1st supralabial when the mouth is closed; in *pardalis* it is in contact with all the 1st and portion of the 2nd.

In *nigricaudis* the postmental is in contact with seven shields (including two infralabials on each side); in *pardalis* it is in contact with five shields (one infralabial on each side).

Nigricaudis has 28 scale rows at midbody; *pardalis* 24.

Nigricaudis is the more sturdily built and compact lizard.

The limbs are stronger and better developed in *nigricaudis* than in *pardalis*, especially the hindlimbs which are longer and markedly more robust.

Fingers and toes in *pardalis* are more slender and more compressed than in *nigricaudis*.

Differences in colour are very striking. The following three are perhaps the most important: (a) the ground colour of *nigricaudis* is reddish-brown, that of *pardalis* pale olive; (b) the back and sides of *nigricaudis* have only a few scattered black spots, the general impression of uniform colouration being scarcely affected except for the distal third of the tail, while *pardalis* is heavily spotted and blotched with black dorsally and laterally on all parts of the head, body and tail; (c) *pardalis* is without the characteristic aggregation of black on the tail, which also extends to the underside, of *nigricaudis*.

V. SPHENOMORPHUS NIGRICAUDIS ELEGANTULUS (Peters and Doria). Pl. xi, fig. 4.

? *Hinulia striatula* Günther (non Steindachner) part, 1875, p. 11; 1877, p. 413. *Lygosoma (Hinulia) elegantulum* Peters and Doria, 1878, p. 344; Zietz, 1920, p. 208; Kinghorn, 1931, p. 89. *Lygosoma elegantulum* Boulenger, 1887, p. 235; ? Oudemans, 1894, p. 140; Boulenger, 1895, p. 29; Broom, 1898, p. 643; de Rooij, 1915, p. 182. ? *Hinulia pardalis* Boulenger, 1904, p. 80.

Peters and Doria's type description of their *Lygosoma (Hinulia) elegantulum* (1878, p. 344) has been translated.

"A *Lygosoma* reddish-brown above, black spotted; underside yellowish; ear opening quite smooth; prefrontals separated; posterior of each pair of frenals trapezoidal; four supraorbitals; body scales in 26 or 28 series, eight rows on the back; rather short feet.

Length from tip of snout to base of tail 65 mm., head 16 mm., forelimb 15 mm., hand with 4th digit 6 mm., hindlimb 22 mm., foot with 4th digit 11 mm.

Hab. North Australia, Somerset. (D'Albertis.)

A species akin to *H. elegans* Gray and *H. fasciolata* Günth. It is of the same colour, reddish-brown dorsally spotted with black, but without the bands which unite with the lateral bars. The scalation of the head does not differ essentially from that of *H. elegans*. The ear, which has its margin perfectly smooth, seems smaller than in the last species. The scales of the body are smooth and shining as in *H. elegans*, but they are larger. In fact in our species we count 26–28 longitudinal rows, while in *H. elegans* and *fasciolata* there are 32–33. The two median rows on the back have larger scales and the two median preanals are also noticeably enlarged. Those of the tail are very large, perfectly smooth, and form towards its base 15 longitudinal series. Those of the middle inferior row are larger than the others.

That which is really noticeable in this species is the proportions of the limbs. In *H. elegans* the forelimb placed along the snout reaches to the anterior margin of the eye, but in our species only to the angle of the mouth. The hindlimb laid along the trunk only reaches a little more than half the distance between groin and axilla.

The underside is whitish.

It is a species discovered by D'Albertis. He collected two specimens at Somerset, Cape York."

Two specimens in the collection of the Australian Museum have been examined. One, a topotype of *Lygosoma (Hinulia) elegantulum* Peters and Doria, R 9599, taken by Melbourne Ward at Cape York near Somerset, has been invaluable for comparison with *S. n. nigricaudis*. A specimen from the Murray Islands, collected by Hedley and McCulloch, is discussed.

Table of Measurements in mm. and Other Characters of *S. n. elegantulum*.

	R 9599	R 4512
Snout-vent	56	48
Tail	77	38+
Snout-forelimb	19	18
Axilla-groin	35	23
Head, length	10	10
Head, width	8	7
Forelimb, length	13	10.5
Hindlimb, length	17	17
Width of body	10	7.5
Axilla-groin/Snout-forelimb	1.84	1.28
Tail/Body	1.38	—
Width of suture of rostral with frontonasal to width of frontal ..	1/4	1/3
Contact of 1st supralabial with nasal	2/3	2/3
Width of suture of frontonasal with frontal to width of nasal ..	1/5	1/8
Length of interparietal to length of frontal	75%	75%
Number of nuchals, left and right	3*-3*	4-4
Scales touching postero-lateral border of parietals, † left and right	4-3	4-3
Supraciliaries	9	9
Infralabials	6	6
Lamellae beneath 4th toe	18	20
Midbody scale rows	28	30

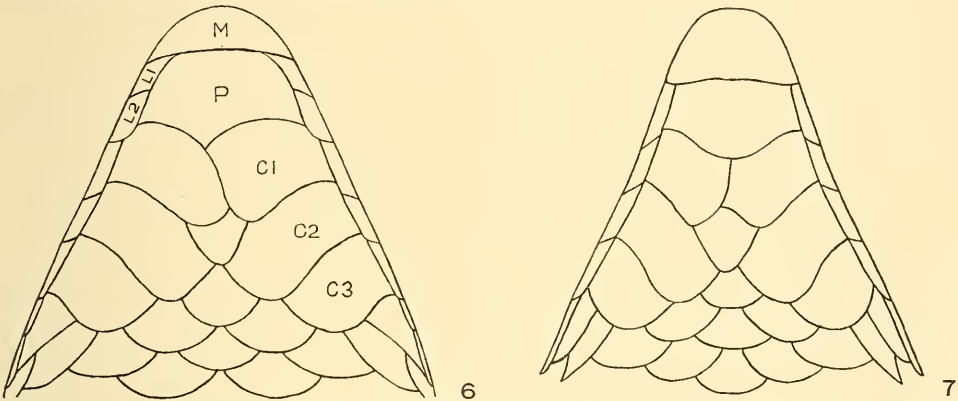
* Rather irregular.

† Including upper secondary temporal, interpolated scales and nuchals.

The lower border of the posterior loreal is in contact with the 2nd supralabial only. Colour of R 9599 is rich reddish-brown dorsally and on the sides of the head and tail. Lighter brown on sides of body. The underside is whitish except for a few short black bars along the margins of the infralabials. The head dorsally is almost unflecked, but dotted with black along the posterior sutures of the parietals and on the temporals and supra- and infralabials. About a dozen interrupted and rather irregular bars formed of heavy black spots run across the back from behind the head to the length of a forelimb behind the shoulders and extend half way down the sides. Posterior to

this area the back of the body is almost uniform brown. The tail is spotted except for the proximal quarter, but there is no dense aggregation of pigment anywhere. The sides are practically immaculate except for the anterior bars.

R 4512 is rather a puzzling specimen. It is hard to place, being a juvenile with its tail broken off and the colour bleached. Banding was probably heavy across the forepart of the body and places it near *S. n. elegantulus*. This is in spite of the fact that the Murray Islands are only about 30 miles from Darnley Island, the type locality of *S. n. nigricaudis*. The two sets of islands, however, were never joined, being of volcanic origin, and must have been colonized separately. Geographical and zoological aspects of the Murray Islands bearing on this matter are dealt with in the fascinating book by Yonge (1930, pp. 183-199, *et al.*). Although R 4512 has been tentatively assigned here to *S. n. elegantulus*, definite identification must await other material from the Murray Islands giving information unavailable from this single, damaged, bleached and juvenile specimen.



Figs. 6-7.—Ventral views of head of lectotype of *S. n. nigricaudis* and holotype of *S. p. pardalis*. Arrangements of the scales are characteristic and apply to the two subspecies of each species. M, mental; P, postmental; C1, C2, C3, 1st, 2nd and 3rd pairs of chin-shields; L1 and L2, 1st and 2nd infralabials.

Retention of *S. elegantulus* as a subspecies of *S. nigricaudis* appears to be well justified. This step is supported by the fact that neither Peters and Doria in their original description (1878, p. 344) nor Boulenger in the first extended description (1887, p. 235), which was followed closely by de Rooij (1915, p. 182), noted black on the tails of their specimens. This most conspicuous feature of *S. n. nigricaudis*, which even now is striking in specimens collected nearly 70 years ago and indeed so impressed Macleay, as shown by his specific name, could not have been overlooked. Except for this omission Peters and Doria's rather generalized description applied exactly to *S. n. nigricaudis*. *S. n. nigricaudis* also differs from *S. n. elegantulus*, on the basis of Boulenger's description, in the following characters. The distance between the end of the snout and the forelimb in *S. n. nigricaudis* is contained from 1.48 to 1.68 times (average 1.57) in the distance between axilla and groin (*S. n. elegantulus*, 1.60 to 2.00). Two specimens of *S. n. nigricaudis* have nine supraciliaries, three 10 (*S. n. elegantulus*, eight, rarely seven or nine). *S. n. nigricaudis* has from two to four pairs of nuchals, but there is generally a different number on each side (*S. n. elegantulus*, three or four pairs). The length of the tail to the length of head and body is 1.18 to 1.23 in *S. n. nigricaudis* (1.33 to 1.50 in *S. n. elegantulus*).

Locality Records.

The following records given by various authors almost certainly apply for the most part to *S. n. elegantulus*, some probably to *S. n. nigricaudis* and *S. p. erro*, but it is most improbable that any apply to *S. p. pardalis*.

Bara Bara: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.

Bégowré River: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.

- Bloomfield River: Loveridge (1934, p. 352) under *S. pardalis*.
 Bogadjim: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Burnett River?: Oudemans (1894, p. 140) under *Lygosoma elegantulum*.
 Chillagoe district: Broom (1898, p. 643) under *Lygosoma elegantulum*.
 Coen: Loveridge (1934, p. 352) under *S. pardalis*.
 Ferguson Island: Boulenger (1895, p. 29) under *Lygosoma elegantulum* (A. S. Meek).
 Fly River: Boulenger (1887, p. 235) under *Lygosoma elegantulum* (Rev. S. Macfarlane).
 Haveri: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Inawi: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Islands of Torres Straits: Günther (1877, p. 413) under *Hinulia striatula*.
 Lake Barrine: Loveridge (1934, p. 352) under *S. pardalis*.
 Lake Sentani: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Lankelly Creek, McIlwraith Ranges: Loveridge (1934, p. 352) under *S. pardalis*.
 Lizard Island?: Boulenger (1904, p. 80) under *Hinulia pardalis* (A. E. Finckh) 1901.
 Merauke: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Moroka, 2,300 feet: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Mount Carbine: Loveridge (1934, p. 352) under *S. pardalis*.
 Mount Spurgeon: Loveridge (1934, p. 352) under *S. pardalis*.
 Mount Victoria: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Murray Island: Boulenger (1887, p. 235) under *Lygosoma elegantulum* (Rev. S. Macfarlane).
 Rocky Scrub, McIlwraith Ranges: Loveridge (1934, p. 352) under *S. pardalis*.
 Rossel Island: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.
 Somerset: Peters and Doria (1878, p. 344) type locality of *Lygosoma (Hinulia) elegantulum*.
 Sorong: Barbour (1912, p. 91) under *Sphenomorphus elegantulus*.
 Sunday Island?: Günther (1875, p. 11) under *Hinulia striatula*, and Boulenger (1887, p. 235) under *Lygosoma elegantulum* (J. B. Jukes).
 Waigeu: de Rooij (1915, p. 183) under *Lygosoma elegantulum*.

Specimens from Waigeu, Begowre River, Lake Sentani and Merauke were examined personally by de Rooij; authority for his other records is not given.

All localities mentioned are shown on the map, except five. Three of these given by de Rooij as from New Guinea—Bara Bara, Haveri and Moroka—have not been traced. Bara Bara may be Bira Bira (10° 39' S, 150° 20' E) near the eastern extremity of New Guinea, but cannot be Bara (3° 9' S, 126° 8' E) on Boeroe or Buru Island to the west of Ceram; and Haveri and Moroka are believed to be near the headwaters of the Aroa River west of Mount Victoria. The other two are the Burnett River (25° 10' S, 152° 6' E) in south Queensland, and Sunday Island (16° 20' S, 123° 10' E) off the coast of Western Australia.

Günther (1875, p. 11) placed specimens from New South Wales and Sunday Island, off the coast of Western Australia, and later (1877, p. 413) other specimens from islands in Torres Straits, in *Hinulia striatula* Steindachner. Lizards from these three localities are almost certainly respectively *Sphenomorphus tenuis tenuis* (Gray), *S. isolepis isolepis* (Boulenger) and *S. nigricaudis elegantulus*. There is a strong probability, however, that the lizards recorded as coming from Sunday Island were collected elsewhere. Boulenger (1877, p. 235) identified two lizards from "Sunday Island?" as *Lygosoma elegantulum*. These two specimens appear to be the ones on which Günther based his record. Boulenger also had specimens from the Fly River (1), Murray Island (7), and islands of Torres Straits (3). Lizards from these localities were collected by the Rev. S. Macfarlane. The "Sunday Island" specimens were presented by J. B. Jukes. Boulenger questions this last record. On the preceding page (p. 234) he had erected *Lygosoma isolepis* to include five specimens from Nicol Bay, Swan River and Australia, previously placed in *Hinulia tenuis* and *H. striatula*. Other specimens placed under *H. striatula* he identified as *Lygosoma elegantulum*.

Oudemans (1894, p. 140) identified a lizard from the Burnett River in southern Queensland as *Lygosoma elegantulum*. Although he said it agreed exactly with Boulenger's description except for having 30 midbody scale rows instead of 28, the specimen probably belongs to one of the closely allied species.

Boulenger (1895, p. 29) notes an individual collected by A. S. Meek on Ferguson Island.

Broom (1898, p. 643), in his paper on the lizards of the Chillagoe district, says of *Lygosoma elegantulum*: "This beautiful *Lygosoma* is not uncommon. Though the large majority of the lizards are found chiefly in the limestone district, all the specimens I obtained of this form were from the granite region where they were found under fallen timber."

Barbour, in giving the first Sorong record (1912, p. 91), says: "A single specimen from Sorong, Dutch New Guinea, agrees well with Boulenger's description. Nevertheless, even a good diagnosis alone, without specimens for comparison, is never very convincing; and if this Sorong specimen were compared directly with authentic examples from Queensland or British New Guinea, it would very possibly be found to be different from *S. elegantulus*. I cannot find any record that it has been previously taken in this region of Papua. It is known from the type locality, and British and German New Guinea."

Loveridge (1934, p. 352) under the heading of *Sphenomorphus pardalis* (Macleay) gives the following synonymy, locality records and remarks:

"*Hinulia pardalis* Macleay: *Mocoa nigricaudis* Macleay: *Lygosoma* (*Hinulia*) *elegantulum* Peters and Doria: *Homolepida crassicauda* Barbour (not of Duméril).

1 (M.C.Z. 9485) Darnley Island, T.S. (H. L. Clark) 1913: 1 (M.C.Z. 10199) Bloomfield River, Q. (Australian Mus.) 1914: 1 (M.C.Z. 35403) Lake Barrine, Q. (P. J. Darlington) 1932: 3 (M.C.Z. 35404-6) Rocky Scrub, McIlwraith Ranges, Q. (P. J. Darlington) 1932: 2 (M.C.Z. 35407-8) Lankelly Creek, Q. (P. J. Darlington) 1932: 1 (M.C.Z. 35409) Mt. Spurgeon, Q. (P. J. Darlington) 1932: 1 (M.C.Z. 35410) Mt. Carbine, Q. (P. J. Darlington) 1932: 1 (M.C.Z. 35411) Coen, Q. (P. J. Darlington) 1932.

The Bloomfield River specimen was received as *Omolepida crassicaudum*; that species, however, has 22 midbody scale-rows. Midbody scale-rows 24-30 (24 in one Rocky Scrub skink only, 30 in the Mt. Spurgeon skink only), average 27; frontonasal forming sutures with the rostral and frontal; usually 3 (2-4) but often an azygous arrangement of scales bordering the parietals posteriorly, such as 2 on one side, 3 on the other, or 2 and 4 in No. 35410; adpressed limbs do not nearly meet; lamellae beneath the fourth toe 16-20, average 18. Largest skink (No. 35407) measures 186 (68 + 118) mm. I follow Zietz (1920, p. 208) in referring *elegantulum* to the synonymy; judged by a comparison of the descriptions the course seems justifiable. I venture to add *nigricaudis* on the strength of our No. 9485 which is a topotype and does not differ in any structural character but only in details of colouring. It lacks the concentration of dots on the base of the tail which caused Macleay to name it *nigricaudis* but it is certainly conspecific with the rest of our series."

Confusion of *S. elegantulus* (Peters and Doria) with *S. pardalis* (Macleay) may be traced to two sources, the first being the scantiness of Macleay's original description. The second occurred between 1901 and 1904. In these PROCEEDINGS, xxvi, 1901, p. 214, under Notes and Exhibits we find: "Mr. S. J. Johnston exhibited a collection of lizards procured by Mr. A. E. Finckh of the University of Sydney, on Lizard Island, during his visit to the Barrier Reef in the early part of this year. It comprised four species, represented by about 35 specimens, namely, *Lygosoma pardalis*, MacL., . . ."

One of these lizards was sent to Boulenger, who says (1904, p. 80) under the heading of *Hinulia pardalis*: "The lizard which bears this name was so imperfectly described by Macleay in 1877 (*Journ. Linn. Soc. N.S.W.*, ii, p. 62), from a collection made at Katow, New Guinea, that, when revising the Scincidae in 1887, I could refer to it only in a footnote (*Cat. Liz.*, iii, p. 209) appended to the general synonymy of the genus *Lygosoma*. I have now received, through the kindness of Mr. S. J. Johnston, of the Technological Museum, Sydney, a specimen collected by Mr. A. E. Finckh on Lizard Island, Queensland, which, he informs me, he has compared with the type of *Hinulia pardalis* in the Macleay Museum, University of Sydney, and found identical with it. From this specimen I conclude that *H. pardalis* is the same as *Lygosoma elegantulum*, Peters and Doria (*Ann. Mus. Genova*, xiii, 1878, p. 344), and, as the former name has priority, I propose in future to designate this rather common species as *Lygosoma pardalis*, Macleay."

I can only suppose that a mistake was made when the two specimens were compared in the Macleay Museum. A rapid examination might have led to characters such as the number of midbody scale rows, relationships of the interparietal, postmental and other scales being overlooked, and the conspicuous differences in markings and colour (as they appear now and as they were originally noted by Macleay for *S. pardalis* and Peters and Doria for *S. elegantulus*) may have been regarded as variable and so unimportant. Possibility of a mistake is made more probable by the fact that it is unlikely that Mr. Johnston had specimens of *S. elegantulus* for comparison. The alternative is that *S. pardalis* occurs on Lizard Island. In this case Boulenger would have made the error of confusing two species. With comparative material at his disposal and in view of his systematic methods in the Catalogue of Lizards and elsewhere, this possibility must be regarded as remote. With Boulenger's authority it was inevitable that the misunderstanding would continue until a thorough re-examination was made of Macleay's type.

S. elegantulus was synonymized with *S. pardalis* by Zietz (1920, p. 208) and Loveridge (1934, p. 352).

VI. MIGRATION AND RELATIONSHIP OF FORMS.

Concerning the evolution and migration of the two species dealt with in this paper, nothing but profit can be gained by presenting an hypothesis in accord with the known facts, which may serve as a framework for future research, provided that the hypothesis is regarded purely as an hypothesis. It appears probable that the common stock, which resembled the present *S. n. elegantulus* fairly closely, arose in western New Guinea. One wave of migration spread into the area now occupied by *S. n. nigricaudis*, where it differentiated into that race. Another wave colonized north Queensland. While part of the population remaining in Cape York Peninsula remained practically unchanged, another became isolated and evolved into a form with a reduced number of midbody scale rows, a characteristic arrangement of scales of the lower jaw, and aggregation of pigment along the flanks. This form retained the colouring of the parent stock and is represented by *S. p. erro*. Representatives of this population became cut off on Barrow Island during the positive movement of sea-level contemporaneous with the growth of the Great Barrier Reef. With the hastening of selection and evolution of pure lines associated with isolation of small populations on small islands, *S. p. pardalis* was evolved. It is of course quite probable, and may square with problems of isolation much better, that north Queensland was colonized twice; the first wave becoming differentiated into the *S. p. erro* stock before the second invasion of individuals still close to the common *S. n. elegantulus* stock from the New Guinea reservoir. If it later proves true that the Murray Islands race is *S. n. elegantulus*, and lack of adequate material for examination at present makes this uncertain, there may have been independent colonization of these islands in the Darnley-Murray Islands area. Transport by canoe or floating timber must have been haphazard, and the degree of chance is enhanced by the fact that the direction of the prevailing winds changes during the year. In summer the north-west monsoon replaces the south-east Trade winds.

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EXPLANATION OF PLATE XI.

Figs. 1-4.—Dorsal views of the four races.

Fig. 1.—*Sphenomorphus pardalis pardalis*.

Fig. 2.—*S. p. erro*.

Fig. 3.—*Sphenomorphus nigricaudis nigricaudis*.

Fig. 4.—*S. n. elegantulus*.

Body lengths of specimens (including head) are 72, 59, 76 and 56 mm. respectively.

[Photos.—Miss A. G. Burns.]